Author Index

Abramowitz, M., 5, 199
Aguilar, O., 212, 218
Aldous, D., 198
Allmaras, M., 207, 218
Anderssen, R., 6
Andersson, F., 147, 154
Apostol, T.M., 21, 130
Aronszajn, N., 131
Arsenin, V.Y., 2
Aster, R.C., viii
Atkinson, A., 72
Avron, H., 148

Backus, G., 152
Bai, Z., 147
Ball, V., 88, 140
Bangerth, W., 207, 212, 218
Barron, A.R., 95
Bates, D.M., 212
Bayarri, M.J., 125, 157
Becker, W., 224
Bekas, C., 149, 150
Belsey, D.A., 72
Benjamini, Y., 166
Berger, J.O., viii, 111, 120, 125, 157, 196, 204
Berger, R.L., viii, 56, 94, 216
Bernardo, J.M., 96, 119
Bertero, M., 1, 6
Bertoin, J., 195
Beutler, F.J., 234
Billingsley, P., 36, 42, 181
Bissantz, N., 152
Blangy, J.P., 140
Blum, M.G.B., 114
Bogachev, V.I., 18, 172, 236
Bond, J.R., 92, 179
Borchers, B., viii
Botev, Z.I., 35
Bowman, A.W., 157
Box, G.E.P., 124
Boyd, S., viii
Breiman, L., 169
Brockwell, P.J., 158
Brooks, S., viii
Brown, J.C., 1, 3
Brown, L.D., 158

Buck, C.E., 93
Buckley, M.J., 143
Bui-Thanh, T., 35
Buland, A., 85, 201

Calvetti, D., viii
Cameron, M.A., 145
Carasso, A., 5
Carlin, B.P., viii, 101, 115, 125, 204
Carlin, J.B., 109, 125
Carter, C.K., 143
Casella, G., viii, 30, 47, 56, 57, 88, 94, 109, 110, 120, 204, 216
Cavalier, L., 128
Chan, T.G., 144
Chang, H., 101
Chang, J.T., 236
Chatfield, C., 221
Chernoff, H., 35
Chobanyan, S.A., 170, 176
Christensen, R., 7, 73, 149
Chung, G., 153
Chung, J., 103, 146
Chung, M., 103
Claerbout, J.F., 148
Clarke, B.S., 95
Collins, A.J., 221
Conover, W.J., 158
Cover, T.M., 195
Cox, D., 116
Cox, D.R., 111
Craig, I.J.D., 3
Cramér, H., 45, 183
Cui, R., 42, 107
Cummins, D.J., 146

DasGupta, A., 41, 42, 158
Datta, G.S., 116
Davis, R.A., 158
Davison, A.C., 156
Dawid, A.P., 82, 93, 110, 124
De Finetti, B., 124, 197, 198
de Hoop, M., 147, 154
Devroye, L., 28, 41
Dey, D.K., 101
Dick, J., 35
Dienstfrey, A., 140

Diestel, J., 177
Donaldson, J.R., 213
Donoho, D.L., 2
Dym, H., 49, 74, 78

Eagleson, G.K., 143
Efromovich, S., 197
Efron, B., 111, 120, 156, 203
Efstathiou, G., 92, 179
Engl, H., viii, 8, 14
Englund, J.E., 144
Evans, S.N., 15

Fabozzi, F., 41
Fan, Y., 148
Fatemi, E., 192
Feller, W., 39
Ferguson, T.S., 33, 36, 39, 40, 43, 67, 95, 116, 215
Ferreita, J.C., 232
Filloon, T.G., 146
Fitzpatrick, P.M., 225
Fox, C., 59
Fréchet, M, 124
Freedman, D., 111, 116

Galatsanos, N.P., 143
Gallant, A.R., 213
Galpin, J.S., 73
Gelfand, A.E., 101
Gelman, A., viii, 109, 111, 125
George, E.I., 109
Ghanem, R.G., 180
Ghosal, S., 116
Ghosh, J.K., 116
Ghosh, M., 96, 116
Gikhman, I.I., 175, 183
Gilbert, F., 152
Gilks, W.R., viii
Golfarb, S., 139
Golub, G., 49, 75, 91, 139, 144, 147
Good, I.J., 111
Green, P.J., 52, 142
Groetsch, C.W., viii, 8, 12, 234
Gu, C., 14, 137, 139, 142, 146
Györfi, L., 28, 41

Härdle, W., 142, 157
Hager, W.W., 91
Hale, P.D., 140
Han, C., 139
Hanke, M., viii, 14
Hansen, P.C., viii, 11, 116, 137, 139
Hanson, R.J., 139
Hart, J.D., 143
Heath, M., 139
Held, L., 57, 59
Hill, J.R., 204
Hinkley, D.V., 156, 204
Hochberg, Y., 65, 166
Hoerl, A.E., 7
Hoffman-Jørgensen, J., 236
Holst, U., 144
Horesh, L., 88
Hotelling, H., 28
Hutchinson, M.F., 147

Izenman, A.J., 27, 28

Jacod, J., 18, 37, 79, 80
Jaynes, E.T., 195
Jeffreys, H., 93
Jennrich, R.I., 213
Johnson, R.A., 28, 67, 221

König, H., 239
Kahane, J.P., 175
Kaipio, J., viii, 93, 116, 192, 193
Kallenberg, O., 23, 198, 236
Kass, R.E., 93, 195
Katsaggelos, A.K., 143
Kennard, R.W., 7
Kirsch, A., viii
Klebanov, L., 41
Kogut, A., 179
Kolbjørnsen, O., 85, 201
Kolmogorov, A.N., 31, 79
Kress, R., viii, 3, 4, 8, 225
Kroese, D.P., 35
Kuh, E., 72
Kuo, F.Y., 35
Kwapien, S., 189

Lad, F., 124
Larsen, A.L., 85
Lassas, M., 194
Lawson, C.L., 139
Le, E.B., 35
Leadbetter, M.R., 183
LeCam, L., 116
Lehmann, E.L., viii, 30, 47, 52, 56, 57, 88, 110, 120, 197, 216

LeVeque, R., 144
Lieb, E.H., 194
Lindeberg, J.W., 39
Lindley, D.V., 102, 111
Lineweaver, C.L., 55
Little, R.J., 111, 126
Loève, M., 184
Lopes, J.S., 114
Lorentz, G.G., 19
Loris, I., 148
Loss, M., 194
Lou, Y., 148
Louis, T.A., viii, 101, 115, 125
Lucero, C., 88
Lugosi, G., 28, 41
Lukacs, E., 38, 58
Lukas, M.A., 137, 146
Lv, J., 148
Lyons, R., 34

Mörters, P., 195
Müller, M., 142
Ma, P., 147, 154
Mair, B., 128
Marcinkiewicz, J., 37
Marinuci, D., 92, 180
Marzouk, Y., 42, 107
Mather, J., 54
McMurry, T.L., 157
Megginson, R.E., 225
Menegatto, V.A., 232
Meng, X.L., 125
Mengersen, K., 100
Mercer, J., 233
Miller, K., 139
Morozov, V.A., 137
Morris, C., 202, 204
Muir, F., 148
Mukerjee, R., 116
Myers, A., 35

Nagy, B.Sz., 233
Nagy, J.G., 11, 146
Naiman, D.Q., 163
Neumaier, A., 8
Nocedal, J., viii
Nolet, G., 148
Nunes, M.A., 114
Nychka, D., 139, 146

O'Hagan, A., 93
O'Leary, D.P., 11, 137, 139, 146
O'Sullivan, F., 137, 138, 152, 153
Omre, H., 85, 201
Opsomer, J.D., 139
Osher, S., 192

Panos, P., 180
Parker, A., 59
Parker, R.L., 1, 179
Parthasarathy, K.R., 176, 236
Paulsen, V.I., 130
Pawitan, Y., 52
Peres, Y., 195
Perlman, M.D., 120
Pinsker, M.S., 41
Politis, D.N., 157
Pollard, D., 236, 242
Protter, P., 18, 37, 79, 80

Révész, P., 33
Rachev, S.T., 41
Raghupathi, M., 130
Ramamoorthi, R.V., 110, 116
Rasmussen, U.A., 120
Riani, M., 72
Rice, J.A., 143
Richardson, S., viii
Riesz, F., 233
Robbins, H., 202
Robert, C., 100
Robert, C.P., viii, 111
Roberts, G.O., 59
Robins, J.M., 125
Robinson, E.A., 3
Rogers, L.C.G., 182, 195
Romano, J.P., viii, 47, 56
Roy, K.K., 110
Royden, H.L., 225
Rubin, D.B., 112, 124
Rubinstein, R.Y., 35
Rudin, L.I., 192
Rudin, W., 225
Rue, H., 57, 59
Ruppert, D., 144
Ruymgaart, F. H., 128

Saad, Y., 149, 150
Sahu, S., 59
Salsburg, D., viii
Saltelli, A., 224

Samaniego, F., viii, 115
Scheffé, H., 41
Schervish, M.J., viii, 90, 94, 95, 110, 215, 242
Schnabel, R.B., 213
Schneider, M.K., 59
Scott, D.W., 197
Seber, G.A.F., 212
Seidenfeld, T., 96, 195, 196
Shannon, C.E., 195
Shiryaev, A.N., 31
Sidák, Z., 65, 70, 162
Siltanen, S., 194
Silverman, B.W., 52, 142
Skorokhod, A.V., 175, 183
Sloan, I.H., 35
Slutsky, E., 43
Smith, A.F.M., 102
Smith, R.C., viii
Smoot, G.F., 54
Somersalo, E., viii, 93, 116, 192, 193
Spantini, A., 42, 103, 107
Stano, P., 224
Stark, P.B., 15, 55, 115, 120, 179, 216, 224
Stegun, I.A., 5, 199
Stein, C., 203
Stern, H.S., 125
Stone, M., 93
Stoyanov, S.V., 41
Stuart, A.M., viii, 172, 176
Sudakov, V.N., 2
Sun, J., 163
Suslin, M.Y., 19
Szymanski, B., 189

Taimre, T., 35
Tamhane, A.C., 65
Tang, J., 149, 150
Tanner, M.A., viii
Tarantola, A., viii
Tarieladze, V.I., 170, 176
Thomas, J.A., 195
Tikhonov, A.N., 2, 14
Titterington, M., 100
Toledo, S., 148
Treitel, S., 3
Tukey, J.W., 127, 141
Turner, T.R., 145

Ulvmoen, M., 85

Vakhania, N.N., 170, 172, 175–177
van der Vaart, A., 33, 40, 125
Van Loan, C.F., 49, 75
Vogel, C.R., viii, 8, 14, 138–140, 192
Von Matt, U., 147

Wahba, G., 14, 131, 137, 139, 157
Wang, Y., 139, 157
Wasserman, L., 93, 195
Watts, D.G., 212
Welsh, R.E., 72
Wheeden, R.L., 21, 77
Wichern, D.W., 28, 67, 221
Wiilcox, K., 42, 107
Wild, C.J., 212
Williams, D., 18, 80, 182, 195
Willsky, A.S., 59
Wright, S., viii

Xiu, D., 180

Yaglom, A. M., 181
Yang, G.L., 116
Yang, Y., 139
Yin, P., 148

Zhang, W., 114
Zidek, J.V., 93
Zygmund, A., 21, 77

General Index

$C[a,b]$, 226
$C^1[a,b]$, 228
$L(\theta;\boldsymbol{y})$, 84
$L^2(E)$, 228, 231
$L^p(E)$, 226, 228
$N_p(\mu,\Sigma)$, 38, 57
$U(0,1)$, 20
$W_m(E)$, 131
$W_p(n,\Sigma)$, 66
$X\sim F$, 22
X^*, 170
$\mathscr{B}(\mathbb{R}^n)$, 17
$\mathbb{C}\mathrm{ov}(X,Y)$, 26
$\mathbb{E}(\boldsymbol{X})$, 25
$\mathbb{E}_\pi$, 91, 178
$\mathbb{I}_A$, 19
$\boldsymbol{K}^\dagger$, 233
$\boldsymbol{K}^\dagger_\lambda$, 134
$\mathscr{K}^*$, 229
$\mathscr{K}^\dagger$, 8, 233
Ω, 17
$\Phi(x)$, 22
$\mathbb{V}\mathrm{ar}(\boldsymbol{X})$, 26
Bias, 47
χ^2_n, 63
$\boldsymbol{e}_i$, 32
ℓ^p, 176, 226, 228
$\perp\!\!\!\perp$, 83
$\langle\,,\,\rangle$, 170
iid, 22
MSE, 49
σ-algebra, 17
  Borel, 17
$\sigma(Y)$, 235
$\widehat{\sigma}^2$, 74
tr, 27
$\boldsymbol{y}_{[i]}$, 73, 101
z_α, 22, 65

a.s. (almost surely), 26, 31
acceptance region, 217
Agresti–Coull interval, 158, 213
approximate Bayesian computation (ABC), 110, 114
association inequality, 27
averaging kernel, 152
AVO inversion, 201

Backus–Gilbert averaging kernel, 152
Banach space, 226
Bayes estimator, 88, 104, 202
  affine optimal, 104
  for $\mathscr{L}_1$ loss, 97
  for $\mathscr{L}_2$ loss, 96
  frequentist MSE, 120
Bayes risk, 87, 88, 104, 203
  optimality of posterior mean, 88
Bayes' theorem, 76, 77, 84, 242
Bayesian central limit theorem, 116
Bayesian inversion, 116
Bayesian linear model, 86, 102, 116
  for linear function of the parameters, 106
  residuals, 108
  unknown variance, 109
  with infinite-dimensional prior, 176
Bayesian methods, 102, 111
  calibrated, 113
  empirical, 86
  hierarchical, 86
  sampling interpretation, 112
Bernoulli random variable, 19
Bernstein–von Mises theorem, 116
bias, 47, 128, 129, 142
  bounds, 154
  median, 154
binomial distribution $B(n,p)$, 50
Bonferroni correction, 65, 164
Bonferroni inequality, 65
bootstrap methods, 50
  nonparametric, 157
  parametric, 156
Borel σ-algebra, 18, 170
Borel set, 18
bounded normal mean problem, 119
boxplot, 141
Breit–Wigner distribution, 29
Brownian process, 182, 195
  KL expansion, 186

calibrated Bayes, 113
Cauchy distribution, 29
Cauchy–Schwarz inequality, 27, 153, 226
central limit theorem, 38
  Bayesian, 116

change of variable formula, 24, 94, 199
characteristic function, 37, 91, 177, 194
  and independence, 37
  and weak convergence, 38
  in ℓ^p, 177
  Lebesgue integrable, 37
Chernoff bounding method, 36
chi-squared distribution χ^2_n, 60
  noncentral, 61, 120
Cholesky factorization, 59
COBE satellite, 54
collinearity, 7
complete normed space, 226
conditional density, 76, 77, 82
conditional expectation, 77
  optimality, 82
conditional independence, 82, 85, 110
conditional probability distribution, 77
  Kolmogorov's definition, 235
  regular, 236
  via disintegration, 236
conditional variance, 80
conditionally iid, 84, 198
confidence intervals/sets, 55, 64, 217
  and hypothesis tests, 217
  Bonferroni correction, 65
  confidence coefficient, 56
  coverage, 55
  FCR corrected, 166
  for bias, 150
  for Tikhonov regularization, 161
  large-sample, 44, 56
  Sidák correction, 65
  simultaneous coverage, 60, 69, 162
conjugate prior, 110
consistent estimator, 49, 213
convergence of moments, 42, 46
convergence of random variables, 31
  almost surely (a.s.), 31, 38
  in CDFs, 40
  in densities, 40
  in distribution, 31, 38
  in Hellinger distance, 41
  in Kullback–Leibler divergence, 41
  in moments, 42
  in probability, 31, 38, 48
  in the quadratic mean, 31, 48
  in total variation distance, 41
  with probability 1, 31
cosmic microwave background (CMB), 54, 92, 180
covariance matrix, 26, 28
  posterior, 97
  posterior update, 103
  sample, 66
covariance of random variables, 26
  properties, 27
covariance operator, 172
coverage, 55
  simultaneous, 60
Cramér's δ-method, 45
Cramér–Lévy's theorem, 37
credible set, 100, 219
  equal-tail, 101
  frequentist coverage, 116
  highest posterior density (HPD), 101, 105, 219
cumulant generating function, 35
cumulative distribution function (CDF), 21, 50

data misfit, 14
degrees of freedom, 74, 141
density estimation, 197
density function, 21
  change of variable, 94
  conditional, 77, 82
  conditional predictive, 101
  joint and marginal, 22
  naming convention, 84
  with respect to a counting measure, 22
  with respect to the Lebesgue measure, 22
diagonal of a large matrix, 149
discrepancy principle, 137, 204
disintegration, 236
  of a product measure, 238
  of Lebesgue measure, 239
distribution, 19
  $F_{m,n}$, 61
  χ^2_n, 60
  t_n, 61
  Bernoulli, 19, 200
  binomial $B(n, p)$, 50
  conditional, 77, 89
  conditional predictive, 101, 108
  conjugate family, 110
  gamma $G(\alpha, \beta)$, 60

Gaussian $N_p(\mu, \Sigma)$, 57
inverse gamma $IG(\alpha, \beta)$, 60, 109
mixture, 113
noncentral χ^2_n, 61
noncentral $\chi^2_n(\lambda)$, 61, 120
permutation invariant, 198
posterior, 96
posterior predictive, 87, 103, 107, 108, 125, 179, 221
prior, 92
prior predictive, 87, 103, 124, 179, 221
sampling, 47, 84
uniform, 23
Wishart $W_p(n, \Sigma)$, 66
dual space, 170, 229

empirical Bayes coverage, 204
empirical Bayesian methods, 86
empirical CDF, 50
empirical distribution function, 50, 157, 210
entropy, 195
estimator, 47
Bayes, 88, 119, 202
consistency, 49, 213
James–Stein, 203
mean squared error (MSE), 47
minimax, 120
minimum variance unbiased, 121
point, 47
set, 47
unbiased, 47
exchangeable sequence, 197
expectation of random variables, 25
approximation bound, 42
conditional, 77
conditional via disintegration, 237
conditional, Kolmogorov's definition, 79
of a quadratic form, 27
optimality, 30
properties, 27
properties of conditional, 81
expected value, 25
of random element, 171
experimental design, 88
exploratory data analysis, 127

false coverage-statement rate (FCR), 166
false discovery rate (FDR), 166
Fisher's information, 94, 215
observed, 215, 216
fitted value
least-squares, 68
Tikhonov, 135
flat prior, 93
forward problem, 1, 225
Fredholm integral equation, 3, 133, 191
frequentist coverage of a Bayesian credible set, 114
frequentist methods, 102, 111
sampling interpretation, 112
frequentist properties of Bayesian procedures, 114
Fubini–Tonelli's theorem, 238

gamma distribution $G(\alpha, \beta)$, 60
Gaussian distribution, 22, 29, 57
L^2-convergence to a Gaussian, 60
and projections, 58
characteristic function, 37, 57
conditionals, 79
continuous mixture, 200
intrinsic, 57
linear/affine transformations, 57
marginals, 79
mixture, 98, 200
multivariate, 57
on ℓ^p, 177
quantiles (z_α), 22
rotation invariance, 23
simulation, 59
standard, 22
without density, 57, 59, 177, 192
Gaussian kernel, 3
Gaussian matrix, 176
Gaussian process, 182, 186
Gaussian random element, 176
generalized cross-validation (GCV), 137
undersmoothing, 139, 145
Gershgorin's theorem, 49
Gibbs sampling, 59, 109
gravity constant, 207

hat matrix, 135, 149
Hellinger distance, 41, 46
hierarchical Bayesian model, 85, 109, 199

highest posterior density (HPD) interval, 101
Hilbert space, 13, 89, 142, 226
  orthonormal basis, 227
  random elements, 172
  reproducing kernel, 131
  separable, 227
Hotelling's T^2, 67
hyperparameters, 200
hyperprior, 200
hypothesis test, 56, 217

importance sampling, 35
independence
  and uncorrelation, 57
  conditional, 82
  of random elements, 170
  of random variables, 22, 77
independent increments, 181
indicator function $\mathbb{I}_A$, 19
inner product, 226
  space, 226
integrable random variable, 25
integral, 21
  Lebesgue, 21
  quadratic-mean, 183
  Riemann, 21
inter-quartile range, 141
invariance
  discretization, 193
  reparametrization, 94
inverse gamma distribution $IG(\alpha, \beta)$, 60
inverse heat transfer problem, 5
inverse problem, 1, 225
  ill-posed, 8, 69
  nonlinear, 190
  parametric reductions, 127
  Tikhonov regularization, 133
  well-posed, 8

James–Stein estimator, 203
Jeffreys' prior, 93, 119
Jensen's inequality, 27
  conditional, 81

Karhunen–Loève expansion, 28, 180
Kolmogorov's three-sum theorem, 175
Kullback–Leibler divergence, 41
  and Jeffreys' prior, 96

L-curve, 137
Laplace transform, 4
law of total probability, 76
laws of large numbers, 33, 123
  in the quadratic mean (L^2), 33
  strong, 33
  weak, 33
least favorable prior, 119
least-squares, 67, 233
  and posterior mean, 106
  and pseudoinverse, 74
  asymptotic normality, 71
  collinearity, 7
  for operators, 233
  minimum norm solution, 8, 233
  nonlinear, 72, 212
  penalized, 7, 129
  weighted, 50, 69
leave-one-out update, 73, 108, 139, 149
Lebesgue's differentiation theorem, 77
leverage factor, 73
  of a large matrix, 149
Levy process, 195
Levy–Khintchin's theorem, 195
likelihood function, 52, 84, 90, 113, 214
limit theorems, 43
Lindeberg–Feller theorem, 39
linear functional, 130, 227
  estimate, 136
  estimator, 17
  evaluation-at-a-point, 130
  Riesz representation, 228
linear regression, 1, 9, 49, 67, 135, 148
  corrected residuals, 73
  recursive residuals, 73
  residuals, 72
  variance estimate, 74
linear space, 225
loglikelihood, 214
loss function, 87

MAD, 29, 144
  recursive, 144
Mahalanobis distance, 50, 62
MAP, 98
Markov chain, 83
Markov property, 83
Markov's inequality, 27, 191
maximum entropy prior, 195
maximum likelihood, 51, 57, 203, 214

asymptotic properties, 215
confidence intervals, 215
mean of a random variable, 25
and L^2 minimization, 30
posterior, 96
mean squared error (MSE), 47, 88, 136, 137
integrated, 137
measurable
function, 19
set, 17
measure, 18
σ-finite, 237
counting, 18
Lebesgue, 18
Radon, 239
median, 29, 144
and L^1 minimization, 30
optimality, 30
posterior, 97
recursive, 144
median absolute deviation from the median (MAD), 29, 144, 161
posterior, 98
recursive, 144
median bias, 154
Mercer's theorem, 184, 232
method of moments, 51, 203, 204
Metropolis–Hastings algorithm, 221
minimax estimator, risk, 120
mixture distribution, 113
moment generating function, 35
moment of a random variable, 26
prior moment conditions, 105
Monte Carlo integration, 34
Moore–Penrose generalized inverse, 233
Morozov's discrepancy principle, 137

nearest neighbors, 84
noise
correlated, 136
random vs deterministic, 2
variance estimate, 74, 137
nonlinear regression, 212
asymptotic properties, 213
confidence intervals, 213
nonparametric regression, 142, 157
norm
L^2, 226
L^p, 226
of matrix, 227
supremum, 226
normed space, 7, 225
nuclear operator, 189
covariance operator, 173

open mapping theorem, 231
operator, 227
adjoint, 229
bounded, 8, 228
compact, 11, 13, 230
compact identity, 231
compact self-adjoint, 231
continuous, 8, 228
convolution, 3
differential, 228
eigenvalue and eigenvector, 229
forward, 1
integral, 228
nonnegative, 229, 233
norm, 228
nuclear, 189
nullspace and range, 227
self-adjoint, 229
singular system, 12, 128, 232
singular values, 231
order statistics, 144
orthogonal expansions, 180

p-value, 125, 157
posterior predictive, 125
prior predictive, 125
parametric reduction model, 134
Bayesian, 190
path regularity, 182
penalized least-squares, 7, 75, 129, 133, 141
bias, 149
properties of estimates, 136
residuals, 135
permutation invariant distribution, 198
Picard's theorem, 12, 232
Pinsker's inequality, 41
Poisson distribution, 181
Poisson process, 181, 187
KL expansion, 187
posterior
covariance matrix, 97
compared to prior, 97
density, 84

distribution, 84, 103, 179
MAD, 98
mean, 96, 103, 179, 219
update of prior, 103
median, 97
mode (MAP), 98
predictive distribution, 87, 189
standard deviation, 97
variance, 103, 179
power set σ-algebra, 18
preposterior risk, 88
principal component analysis (PCA), 28, 221
prior
conjugate, 93, 110
density, 84, 90
diffuse, 96, 120
flat, 93
Gaussian mixture, 98
hyperprior, 200
improper, 93, 120
Jeffreys, 94, 119
least favorable, 120
maximum entropy, 195
moment conditions, 105
noninformative, 93
on ℓ^p, 176
predictive distribution, 87
reference, 93, 119
smoothness, 116, 192, 193
structural, 93, 193
support, 86
total variation, 193, 194
probability mass function, 21, 76
probability measure, 17
conditional, 82, 89, 235
probability theory, 17
projection matrix, 59, 63, 68, 148
propagation of error formula, 52
pseudoinverse, 8, 13, 233
and Tikhonov regularization, 75
properties of estimates, 74
transpose, 233
pure error variance estimate, 141

q.m. (quadratic mean), 32
quadratic mean convergence, 31
quadratic mean integral, 183
properties, 184
quadrupole, 54, 179
quantile, 22
quantile function, 210
quasi-Monte Carlo methods, 35

random element, 169, 235
covariance operator, 172
distribution, 170
Gaussian, 176
in ℓ^p, 177
in a Banach space, 173
independence, 169
mean, 171
of strong order p, 171, 173
of weak order p, 171, 172
orthogonal expansion, 188
random series, 175
random sum, 174
separably valued, 173
variance, 175
random series in Banach space, 175
random sum in Banach space, 174
random variable, 17
Bernoulli, 19
continuous, 21
discrete, 21
distribution, 17
existence, 23
functions of, 20
integrable, 25
uncorrelated, 26
uniform, 20, 22
regular conditional probability, 236
regularization, 8
ℓ^1, 148, 154
generalized Tikhonov, 14
Tikhonov, 14
tuning parameters, 8
regularization parameter, 8
L-curve, 137
discrepancy principle, 137
GCV selection, 137, 146
Regularization Tools, 117
reproducing kernel, 131, 152
Hilbert space, 131, 142, 152, 176
resampling methods, 156
residuals, 72, 135
Bayesian, 101, 107
corrected, 73
cross-validated, 73, 149
deleted, 211

predictive, 73, 101
recursive, 73, 209
studentized deleted, 74
ridge regression, 7, 9
Riesz representation theorem, 131, 172, 178, 228, 230

sample covariance matrix, 66
sample mean and standard deviation, 144
sample space, 18
sample variance, S^2, 61
asymptotically independent of $\overline{X}$, 46
Schur complement, 79
and posterior covariance matrix, 104
score function, 94, 95
second-order process, 180
Karhunen–Loève expansion, 185
q.m.-continuous, 181
separable space, 170, 226
sequence space model, 128
Sidák's correction, 65
singular system, 12, 128, 232
singular value decomposition (SVD), 9, 230
Slutsky's theorems, 43
Sobolev space, 14
sparse signal, 148, 154
spherical harmonics, 179
spline smoothing, 132, 142
stationary increments, 181, 194
steady-state diffusion, 133
stochastic process, 169
equivalent, 181
Gaussian, 186
paths, 181
q.m.-continuous, 180
second order, 180
strong law of large numbers, 33
strong order p, 171
sufficient statistic, 110
surrogate model, 208
Suslin set, 19

Tikhonov regularization, 14, 129, 133, 141, 149, 191
ℓ^1 penalty, 148
experimental design, 88
trace estimators, 147, 150
triangle inequality, 225

unbiased estimator, 47
unbiased predictive-risk estimator, 138
uniform integrability, 42

variance of a random variable, 26
δ-method, 52
Volterra integral equation, 5, 6

weak law of large numbers, 33
weak order p, 171
Wiener process (see Brownian process), 182
Wishart distribution, 66
Woodbury's identity, 91, 103